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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/730,571 | 12/08/2003 | David J. Orlin | 1894-SPL | 4208 |

26085 7590 02/27/2007

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| EXAMINER | |
|---|---|
| FLORES, LEON | |
| **ART UNIT** | **PAPER NUMBER** |
| 2611 | |

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|---|---|---|
| 3 MONTHS | 02/27/2007 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/730,571 | ORLIN, DAVID J. | |
| | Examiner | Art Unit | |
| | Leon Flores | 2611 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *12/8/2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/8/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 1-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sekiguchi et al (hereinafter Sekiguchi) (JP 11308130 A) in view of Drabowitch et al (hereinafter Drabowitch) (US Patent 4,672,378).**

Re claim 1, Sekiguchi discloses a method of suppressing side lobe interference in a beamforming process (See Abstract), the method comprising: receiving a plurality of sensor signals comprising elemental data (See fig. 1: 1-N); forming a main beam comprised of main beam samples using all of the sensor signals (See fig. 1: the output of element 5); calculating a complex weighting factor for each signal in a pair such that the maximum response axis of the resulting signal pair combination is aligned with the

maximum response axis of the main beam (See fig. 1: element 23a & 22 & paragraphs 32 & 33); computing a covariance matrix, M, using the delta-channel auxiliary signals(See fig. 6: the output of element 21b & paragraph 74 & equation 5); computing a cross-covariance vector, A, using the delta-channel auxiliary signals and the main beam (See fig. 1: the output of element 21a & equation 6); computing a vector of delta-channel auxiliary signal weights (See fig. 6: the output of element 9-B); multiplying each sample from each delta-channel auxiliary signal by its corresponding weight to yield weighted delta-channel auxiliary signals (See fig. 6: the output of elements 9-B); summing the weighted delta-channel auxiliary signals to obtain suppressor channel samples (See fig. 6: 10); and subtracting the suppressor channel samples from the main beam samples to obtain an interference-free main beam (See fig. 6: element 6)

But the reference of Sekiguchi fails to specifically disclose combining a subset of the sensor signals into signal pairs; assigning opposite amplitudes to each signal in the pair to produce delta-channel auxiliary signals having zero response along the maximum response axis. However, Drabowitch does. (See fig. 8: elements 26-27 & col. 6, lines 21-60 & see abstract.)

Drabowitch discloses a method and apparatus for reducing the power of jamming signals received by radar antenna sidelobes. Figure 8 illustrates two couplers that are connected to a set of sub-arrays. Each of these couplers defines a different set of paths, one being the main path and the other the difference path. The former consists of summing all of the arrays to obtain a signal (main lobe). And the latter consists of taking the difference between two arrays to obtain a signal (sidelobe).

Taking the combined teachings of Sekiguchi & Drabowitch as a whole, it would have been obvious to one of ordinary skill in the art to have modify the system of Sekiguchi in the manner as claimed, and as taught by Drabowitch, for the benefit of obtaining a difference auxiliary pattern with a relatively high gain.

Re claim 2, the combination of Sekiguchi & Drabowitch further discloses that wherein the signal pairs are comprised of signals from sensors that are adjacently located near the edges of the array. (In Drabowitch, see fig. 8)

Re claim 3, the combination of Sekiguchi & Drabowitch further discloses that wherein each member of the covariance matrix, M, is an estimate of the covariance between two delta-channel auxiliary signals such that the whole matrix contains estimates of every possible delta-channel auxiliary signal combination and the main diagonal of the covariance matrix contains the variance of the corresponding delta-channel auxiliary signal. (In Sekiguchi, see paragraphs 67 &74.)

Re claim 4, the combination of Sekiguchi & Drabowitch further discloses that wherein the covariance matrix, M, is calculated according to: $M = (1/N)*(A*A^H)$.where, the delta-channel auxiliary signal samples are arranged along columns in a matrix A; N is the number of samples; and H denotes combined conjugation and transposition. (In Sekiguchi, see paragraphs 67 &74.)

Re claim 5, the combination of Sekiguchi & Drabowitch further discloses that wherein the samples from the main beam are arranged in a column vector, Bo, and the cross-covariance vector, A, is calculated according to: A = I(A.B0n). N (In Sekiguchi, see equation 6)

Re claim 6, the combination of Sekiguchi & Drabowitch further discloses that wherein the delta-channel auxiliary signal weights are calculated according to: $w=(M^{-1}A)^*$ where the (*) symbol denotes conjugation. (In Sekiguchi, see equation 4)

Re claim 7, the combination of Sekiguchi & Drabowitch further discloses that applying an element-by-element weighting to the elemental data to adjust the maximum response axis of the array of sensors and to reduce array sidelobe levels. (In Sekiguchi, see equation 11)

Claim 8 is a system claim corresponding to method claim 1. Hence, the steps performed in method claim 1 would have necessitated the elements in claim 8. Therefore, claim 8 has been analyzed and rejected in view of claim 1.

Claim 9 is a system claim corresponding to method claim 2. Hence, the steps performed in method claim 2 would have necessitated the elements in claim 9. Therefore, claim 9 has been analyzed and rejected in view of claim 2.

Claim 10 is a system claim corresponding to method claim 3. Hence, the steps performed in method claim 3 would have necessitated the elements in claim 10. Therefore, claim 10 has been analyzed and rejected in view of claim 3.

Claim 11 is a system claim corresponding to method claim 4. Hence, the steps performed in method claim 4 would have necessitated the elements in claim 11. Therefore, claim 11 has been analyzed and rejected in view of claim 4.

Claim 12 is a system claim corresponding to method claim 5. Hence, the steps performed in method claim 12 would have necessitated the elements in claim 5. Therefore, claim 12 has been analyzed and rejected in view of claim 5.

Claim 13 is a system claim corresponding to method claim 6. Hence, the steps performed in method claim 13 would have necessitated the elements in claim 6. Therefore, claim 13 has been analyzed and rejected in view of claim 6.

Claim 14 is a system claim corresponding to method claim 7. Hence, the steps performed in method claim 14 would have necessitated the elements in claim 7. Therefore, claim 14 has been analyzed and rejected in view of claim 7.

Claim 15 is a system claim corresponding to method claim 1. Hence, the steps performed in method claim 1 would have necessitated the elements in claim 15.

Therefore, claim 15 has been analyzed and rejected in view of claim 1. Furthermore, the system of Sekiguchi is an adaptive algorithm- based system.

Claim 16 is a system claim corresponding to method claim 2. Hence, the steps performed in method claim 2 would have necessitated the elements in claim 16. Therefore, claim 16 has been analyzed and rejected in view of claim 2. Furthermore, the system of Sekiguchi is an adaptive algorithm- based system.

Claim 17 is a system claim corresponding to method claim 3. Hence, the steps performed in method claim 3 would have necessitated the elements in claim 17. Therefore, claim 17 has been analyzed and rejected in view of claim 3. Furthermore, the system of Sekiguchi is an adaptive algorithm- based system.

Claim 18 is a system claim corresponding to method claim 4. Hence, the steps performed in method claim 4 would have necessitated the elements in claim 18. Therefore, claim 18 has been analyzed and rejected in view of claim 4. Furthermore, the system of Sekiguchi is an adaptive algorithm- based system.

Claim 19 is a system claim corresponding to method claim 5. Hence, the steps performed in method claim 5 would have necessitated the elements in claim 19. Therefore, claim 19 has been analyzed and rejected in view of claim 5. Furthermore, the system of Sekiguchi is an adaptive algorithm- based system.

Claim 20 is a system claim corresponding to method claim 6. Hence, the steps performed in method claim 6 would have necessitated the elements in claim 20. Therefore, claim 20 has been analyzed and rejected in view of claim 6. Furthermore, the system of Sekiguchi is an adaptive algorithm- based system.

Claim 21 is a system claim corresponding to method claim 7. Hence, the steps performed in method claim 7 would have necessitated the elements in claim 21. Therefore, claim 21 has been analyzed and rejected in view of claim 7. Furthermore, the system of Sekiguchi is an adaptive algorithm- based system.

***Contact***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Flores whose telephone number is 571-270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LF
January 29, 2007

David C. Payne
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PRIMARY PATENT EXAMINER